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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/697,821
Filing Date: October 29, 2003
Appellant(s): COCHRAN ET AL.

Christopher R. Rogers
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 02/09/2010 appealing from the Office action mailed 10/21/2009.

(1) Real Party in Interest

A statement of the status of claims contained in the brief is correct.

(2) Related Appeals and Interferences

A statement identifying by name the real party in interest is contained in the brief.

The following are the related appeals, interferences, and judicial proceedings known to the examiner which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

7047358	Lee et al.	05-2006
U.S 2003/0158999	Hauck et al.	08-2003

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4 and 10-13, 18-21 and 24-25 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Belsan et al. (U.S. patent No. 5,403,639).

Regarding claim 1, Belsan et al. discloses a storage system and a method of managing information storage in a storage system comprising:

a storage array a cabinet (i.e., "a data storage media environment that can be heterogeneous. Multiple types of media **can be included within** or connected to file server system 1" (col. 4, line 60-62) and fig. 1), a plurality of storage devices contained within the cabinet of at least three different and distinct controller-to-storage device bus interface technology

types (i.e., "The data storage and management capability can include changing the format of the data stored to accommodate **various combinations of heterogeneous data processors**" (col. 2, line 18-22)) including volatile solid stage (i.e., "cache memory 113" (col. 9, line 10), and "the disk drive array data storage sub-system 100" (col. 8, line 30-35) and "tape drive subsystem that can be an automated magnetic tape cartridge library system" (col. 8, line 15-18) and Examiner asserts that **three different** are "cache", "disk drive array" and "magnetic tape cartridge" (fig. 2)) and having a respective class hierarchy (i.e., "The media used to store the data can be a disk array or any other media or combinations of media such as a disk array in combination with a backend automated magnetic tape cartridge library system, including a plurality of tape drives such that **the file serve system** comprises a **hierarchical data storage system** containing multiple types of media" (col. 3, line 30-35)); and

a controller contained within the cabinet (fig. 1) and coupled to the storage device plurality that executes hierarchical storage management and selectively controls (i.e., "The media used to store the data can be a disk array or any other media or combinations of media such as a disk array in combination with a backend automated magnetic tape cartridge library system, including a plurality of tape drives such that **the file serve system** comprises a **hierarchical data storage system** containing multiple types of media" (col. 3, line 30-35)) usage of storage according to the different and distinct controller-to-storage device bus interface technology type (i.e., "a third form of redundancy consists of **high usage** patterns" (col. 12, line 1-20) and "The disk drives 122-1 to 125-r are significantly **less expensive**" (col.8, line 40-42) and "Data that is stored in low access cylinders" (col. 32, line 10-15)) whereby the controller allocates hierarchically inferior storage for temporary storage unexpected mission-critical storage (i.e., "when data is **collected** and written to a cylinder separate from the normal destaging cylinder, that data is read-only or **low access** relative to the rest of the data in the logical cylinder...to **the hierarchical algorithm** since they differentiate data into **low access and regular access logical cylinders**" (col. 31, line 40-47) and

Examiner asserts that "data is collected" is equivalent with "temporary storage" of claimed invention), and hierarchical storage management (HSM)-type low usage data storage (i.e., "control unit initiates the migration process at step 1501 and selects a logical cylinder at step 1502, identified as a low access cylinder by calculating the access rate from the last three fields in the Free space Directory Entry as illustrate in Fig. 14" (col. 32, line 25-30)).

But even if the Belsan comes shorting stating the single cabinet, it would still have been obvious to enclose all these driver or storage in a single enclosure not only to protect it from contamination but to make it portable.

With respect to claim 2, Belsan et al. discloses the storage array contains a hierarchy of storage devices connected by at least three different and distinct controller-to-storage device bus interface technology types and having a respective performance hierarchy (i.e., "The media used to store the data can be a disk array or any other media or combinations of media such as a disk array in combination with a backend automated magnetic tape cartridge library system, including a plurality of tape drives such that **the file serve system** comprises a **hierarchical data storage system** containing multiple types of media" (col. 3, line 30-35) and "cache memory 113" (col. 9, line 10), and "the disk drive array data storage sub-system 100" (col. 8, line 30-35) and "tape drive subsystem that can be an automated magnetic tape cartridge library system" (col. 8, line 15-18) and Examiner asserts that **three different** are "cache", "disk drive array" and "magnetic tape cartridge" (fig. 2))

With respect to claim 3, Belsan et al. discloses the storage array contains a hierarchy of storage devices connected by of at least three different and distinct controller-to-storage device bus interface technology types and having a respective economic or cost hierarchy (i.e., "cache memory 113" (col. 9, line 10), and "the disk drive array data storage sub-system 100" (col. 8, line 30-35) and "tape drive subsystem that can be an automated

*magnetic tape cartridge library system" (col. 8, line 15-18) and "The disk drives 122-1 to 125-r are significantly **less expensive**" (col.8, line 40-42) and Examiner asserts that **three different** are "cache", "disk drive array" and "magnetic tape cartridge" (fig. 2).*

With respect to claim 4, Belsan et al. discloses a solid-state cache (i.e., "cache memory 113" (col. 9, line 10)) and shared memory (14) supplying storage as a distinct storage device type for a level of hierarchical storage for a level of hierarchical storage (figs. 1-2).

Regarding claim 10, Belsan et al. discloses the same limitation of claim 1 (see rejection of claim 1).

With respect to claim 11, Belsan et al. discloses the storage array contains a hierarchy of storage devices connected by at least three different and distinct controller to-storage device bus interface technology types and having a respective performance hierarchy (i.e., "The media used to store the data can be a disk array or any other media or combinations of media such as a disk array in combination with a backend automated magnetic tape cartridge library system, including a plurality of tape drives such that **the file serve system** comprises a **hierarchical data storage system** containing multiple types of media" (col. 3, line 30-35) and "cache memory 113" (col. 9, line 10), and "the disk drive array data storage sub-system 100" (col. 8, line 30-35) and "tape drive subsystem that can be an automated magnetic tape cartridge library system" (col. 8, line 15-18) and Examiner asserts that **three different** are "cache", "disk drive array" and "magnetic tape cartridge" (fig. 2))

With respect to claim 12, Belsan et al. discloses the storage array contains a hierarchy of storage devices connected by of at least three different and distinct controller-to-storage device bus interface technology types and having a respective economic or cost hierarchy (i.e., "cache memory 113" (col. 9, line 10), and "the disk drive array data

*storage sub-system 100" (col. 8, line 30-35) and "tape drive subsystem that can be an automated magnetic tape cartridge library system" (col. 8, line 15-18) and "The disk drives 122-1 to 125-r are significantly less expensive" (col.8, line 40-42) and Examiner asserts that **three different** are "cache", "disk drive array" and "magnetic tape cartridge" (fig. 2).).*

With respect to claim 13, Belsan et al. discloses at least a volatile-shared memory, a relatively higher performance non-volatile storage (*i.e., a plurality of segments of volatile cache memory 113" (col. 17, line 1-5)*), and a relatively lower performance non-volatile storage (*i.e., "Changes to the virtual track directory are journaled to a non-volatile store" (col. 19, line 3-7)*).

Regarding claim 18, Belsan et al. discloses the same limitation of claim 1 (see rejection of claim 1).

With respect to claim 19, Belsan et al. discloses a solid-state cache (*i.e., "cache memory 113" (col. 9, line 10)*) and shared memory (14) supplying storage as a distinct storage device type for a level of hierarchical storage for a level of hierarchical storage (*figs. 1-2*)

With respect to claim 20, Belsan et al. discloses an hierarchy of storage devices having a respective performance hierarchy (*i.e., "The media used to store the data can be a disk array or any other media or combinations of media such as a disk array in combination with a backend automated magnetic tape cartridge library system, including a plurality of tape drives such that the file serve system comprises a hierarchical data storage system containing multiple types of media" (col. 3, line 30-35) and "cache memory 113" (col. 9, line 10), and "the disk drive array data storage sub-system 100" (col. 8, line 30-35) and "tape drive subsystem that can be an automated magnetic tape cartridge library system" (col. 8, line 15-18) and Examiner asserts that **three different** are "cache", "disk drive array" and "magnetic tape cartridge" (fig. 2)*)

With respect to claim 21, Belsan et al. discloses a hierarchy of storage devices having a respective economic or cost hierarchy (*i.e.*, "cache memory 113" (col. 9, line 10), and "the disk drive array data storage sub-system 100" (col. 8, line 30-35) and "tape drive subsystem that can be an automated magnetic tape cartridge library system" (col. 8, line 15-18) and "The disk drives 122-1 to 125-*r* are significantly **less expensive**" (col.8, line 40-42) and Examiner asserts that **three different** are "cache", "disk drive array" and "magnetic tape cartridge" (fig. 2)).

Regarding claims 24-25, Belsan et al. discloses the same limitation of claim 1 (see rejection of claim 1).

Claim Rejections - 35 U.S.C. § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

a. Claim 5-9, 14-17 and 23 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Belsan et al. (U.S. patent No. 5,403,639) in view of Lee et al. (U.S. Pat. No. US007047358B2).

Regarding claims 5 and 14, Belsan et al. discloses all limitations of claimed invention recited in claims 1, 10 and 18 except for small computer Systems Interface (SCSI) and/or Fiber Channel (FC) storage device coupled to the controller by SCSI and/or FC Buses and supply storage as a distinct controller-to-storage device bus interface technology type for a level of hierarchical storage. However, Lee et al. discloses small computer Systems Interface (SCSI) and/or Fiber Channel (FC) storage

device coupled to the controller by SCSI and/or FC Buses and supply storage as a distinct controller-to-storage device bus interface technology type for a level of hierarchical storage (*i.e.*, “NVRAM is often employed in higher-end **SCSI and Fibre Channel RAID controllers** because it improves performance for many applications and confers reliability benefits in the face of power failure” (col. 5, line 65-67 and col. 6, line 1-5)) . It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify Belsan et al.’s system to use SCSI and/or FC in order to improves performance for many applications and confers reliability benefits in the face of power failure for the stated purpose has been well known in the art as evidenced by teaching Lee et al. (col. 5, line 65-67 and col. 6, line 1-5).

Regarding claim 6, Belsan et al. discloses all limitations of claimed invention recited in claim 1 except for serial AT-attached (SATA) storage devices coupled to the controller by a SATA bus. However, Lee et al. discloses serial AT-attached (SATA) storage devices coupled to the controller by a SATA bus (*i.e.*, *There is some expectation within the ATA community that the widespread adoption of serial ATA will result in an increase of drive counts within standard rackmount servers*” (col. 6, line 2-7)) and supplying storage as a distinct controller to-storage device bus interface technology type for a level of hierarchical storage (*Examiner asserts Lee et al. discloses “serial ATA will result in an increase of drive counts” ” (col. 6, line 2-7) so therefore, SATA, SCSI and Fibre are supported by controller for level of hierarchical storage and further, with the same structure as SATA, SCSI and Fibre, those storage will supports the same as claimed invention*)). It would have been obvious at the time the invention

was made to a person having ordinary skill in the art to modify Belsan et al.'s system to use SATA in order to have opportunity involves its cost saving when storing the data that is less accessed for the stated purpose has been well known in the art as evidenced by teaching Lee et al (*col. 6, line 4-7*).

Regarding claims 7, 15, and 23, Belsan et al. and Lee et al. discloses all limitation of claim 7 that included the limitations of claims 4-6 (see rejection above) and with the same motivation as claims 5-6 above and Lee et al. discloses "ATA storage opportunity involves its cost saving over alternative drive" (*col. 6. line 4-7*).

Regarding claims 8 and 16, Belsan et al. discloses an hierarchical storage management controller for usage with a disk array (*i.e., "The media used to store the data can be a disk array or any other media or combinations of media such as a disk array in combination with a backend automated magnetic tape cartridge library system, including a plurality of tape drives such that the file serve system comprises a hierarchical data storage system containing multiple types of media"* (*col. 3, line 30-35*)) and Lee et al. discloses FC and SATA disk drivers and that allocates SATA storage as uncommitted and unstructured storage (*see rejection 5-6 above and Examiner asserts that with the same structure and physical of SATA disk and FC, therefore, those storages interface will have the same function as allocating as uncommitted and unstructured storage*).

Regarding claims 9 and 17, Belsan et al. and Lee et al. discloses same limitation as recited in claim 5-6 (see rejection above) and further, Belsan et al. discloses data transfers including logical unit copies and snapshots (*i.e., "using the copy*

table implementation of the snapshot copy operation" (col. 21, line 5-10 and col. 20, line 30-40)).

- b. Claim 22 is rejected under 35 U.S.C. 103 (a) as being unpatentable over Belsan et al. (U.S. patent No. 5,403,639) in view of Hauck et al. (U.S. Pub. No. US2003/0158999 A1).

Regarding claim 22, Belsan et al. discloses the controller comprising at least two controller units (*Belsan discloses the multiple types of media can be included within in enclosure therefore, the system will have multiple types bus interface technology types in order to support for the multiple types of media (Fig. 1 and col. 4, line 60-62)*) but Belsan does not disclose explicitly a cache mirror connection between the at least two controller units. However, Hauck et al. discloses a cache mirror connection between the at least two controller units (*i.e., "The controller system includes a disk array, a first controller, coupled to the disk array, for selecting a mirror cache line "n a second controller cache line to the second controller cache line" (0021)*). It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify Belsan et al.'s system to use a cache mirror in order to improve performance access of disk system and minimize the performance degradation for the stated purpose has been well known in the art as evidenced by teaching Hauck et al. (0016).

(10) Response to Argument

I. (issue): Ground of Rejection No. 1

Independent claims 1, 10, 18, 24 and 25 are not anticipated by or obvious over Belsan.

a. In the first argument , the Appellant states *"Belsan disclose storage units that appear to contain a single controller-to-storage device bus interface technology type...Moreover, Belsan makes no reference to different controller-to-storage technologies"* page 10, second paragraph.

Examiner respectfully disagrees. Belsan discloses three of storage device such as Cache memory (113) (fig. 2) (col. 9, line 10), the disk drive array data storage subsystem 100 (fig. 2) (col. 8, lines 30-35) and magnetic type cartridge (10) (fig. 2). Further, Belsan disclose the **first control** for Cache memory (*i.e., "control of cache memory 113 is provide in control unit 101 by processor 204-0"* (col. 11, lines 29-54)), **second control** for the disk drive array data storage subsystem (*i.e., The disk drive array data storage sub-system 110 appears to the associated host processors 11-12 to be a collection of storage devices, such as large from factor disk drives with their associated storage control"* (col. 8, lines 32-40)), and third control for the magnetic type cartridge is tape drive control unit 10 (fig. 2). There are three different controller-to-storage device bus interface technology types for three different storage such as Cache, disk drive and magnetic. Further, Appellant alleges that none of these devices are controller-to-storage unit but interface type such as small computer System interface (SCSI), Fiber Channel (FC) and serial AT-attached (SATA) (page 11, first paragraph). In response to appellant's argument that the references fail to show certain features of appellant's invention, it is noted that the features upon which applicant relies (*i.e., small computer System interface (SCSI), Fiber Channel (FC) and serial AT-attached (SATA)*) are not recited in the rejected claim(s) 1, 10, 18, 24 and 25. Although the claims are

interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

b. In the second argument, Appellant states "*Belsan does not disclose "a controller contained within the cabinet and coupled to the storage device plurality that executes hierarchical storage management and selectively controls usage of storage according to the different and distinct controller-to-storage device bus interface technology type" as recite in claim 1. Indeed, Belsan gives no indication that the controller disclosed is even capable of accessing multiple types of controller-to-storage bus interface bus interface technologies...the Appellants respectfully request that the Board reverse the rejection under 35U.S.C 102(B)/103(a)"* pages 12-13.

Examiner respectfully disagrees since even the Belsan comes to shorting the staring the single cabinet, it would still have been obvious to enclose all these driver or storage in a single enclosure not only to protect it from contamination but to make it portable. Further, Belsan discloses clearly three different and distinct controller-to-storage device bus interface technology types (see Examiner's response above at part a). Again, in response to appellant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which appellant rely (i.e., "controller capable of accessing storage devices using three different and distinct type of bus interface") are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

The claims do not recite "accessing storage devices using three different and distinct type of bus interface" but Belsan discloses three different and distinct type of bus interface (see part a above). Further, Belsan discloses hierarchical storage management and selectively controls usage of storage according to the different and distinct controller-to-storage device bus interface technology type (i.e., "*The media used to store the data can be a disk array or any other media or combinations of media such as a disk array in combination with a backend automated magnetic tape cartridge library system, including a plurality of tape drives such that **the file serve system** comprises a **hierarchical data storage system** containing multiple types of media*" (col. 3, line 30-35) or (i.e., "*when data is **collected** and written to a cylinder separate from the normal destaging cylinder, that data is read-only or **low access** relative to the rest of the data in the logical cylinder...to **the hierarchical algorithm** since they differentiate data into **low access and regular access logical cylinders**" (col. 31, line 40-47)) .Therefore, Belsan anticipates or, in the alternative, render obvious over claims 1, 10, 18, 24 and 25.*

II. (Issue): Ground of Rejection No. 2

c. In the third argument, Appellant states "*Further, Lee does not remedy the deficiencies of Belsan, either alone or in any hypothetical combination. Instead, Lee is directed to implementing a RAID 5 storage system using a log-structured approval. See Lee, col. 7, 11. 20-32. Lee does not disclose the use of "three different and distinct controller-to-storage device bus interface technology type" or ...see Final Office Action, pp. 8-9.*" pages 13-14.

Examiner does not agree with Appellant's argument since Belsan discloses all limitation recites at claims 1, 10, 18, 24 and 25. Further, Lee discloses the deficiencies of Belsan such as SCSI and FC storage (see rejection above). Therefore, Belsan and Lee disclose all of the element recited in the claims 5-9, 14-17 and 23.

III. (Issue): Ground of Rejection No. 3.

d. In the fourth argument, Appellant states "*Further, Hauck does not remedy the deficiencies of Belsan, either alone or in any hypothetical combination. Instead, Hauck is directed to implementing a data storage system for maintaining cache coherency in a storage system. See Hauck, para [0002]. Hauck does not disclose the user of "three different and distinct controller-to-storage device bus interface technology types" or a controller capable of accessing storage devices using three distinct types of bus interface, nor does the Examiner allege that it does...the Board reverse the rejection of claim 22 under 35 U.S.C 103(a).*" page 14.

Examiner does not agree with Appellant's argument since Belsan discloses all limitation recites at claims 1, 10, 18, 24 and 25. Further, Hauck discloses the deficiencies of Belsan such as cache mirror connection between the at least two controller units (see rejection above). Therefore, Belsan and Hauck disclose all of the element recited in the claim 22.

Therefore, the claims are not patentable over Belsan, Lee and Hauck.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Hung T Vy/

Primary Examiner, Art Unit 2163

Conferees:

/don wong/

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